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The Standardization Work of Technical Societies and Trade Associations[1]

by

P. G. Agnew, *Secretary*
American Standards Association

A Description of the Standardization Work of Several Representative Trade Associations and Technical Societies

All buying and selling in which goods do not come under the immediate personal inspection of the purchaser must necessarily be based upon some sort of a standard.

In most cases the standard is unwritten, simple, and crude, often being no more than a two-party understanding, perhaps being merely "just like the one I got of you last time."

At the other extreme, all of the great commodity markets are absolutely dependent upon standards which are, in most cases, well worked out, are nationally accepted and used, and may be even subject to legal definition, as is the case in wheat and in cotton. In the absence of such perfectly definite and thoroughly understood standards, the buyer would himself have to see the wheat, corn, cotton, or copper with his own eyes and hence he would not be able to buy by mail or telegraph or telephone, or through other indirect means. Neither would he be able to deal in futures.

In between these extremes, we have a great number of types and classes of standards in various stages of development. One of the oldest and most widely used of these types is the trade brand, which is merely one form of company standard developed wholly from the point of view of selling.

The majority of industrial standards now in use have been evolved through a more or less unconscious process, but during the last half century there has arisen in this country a great mass of consciously developed standards. These present a great variety in form, subject matter, content, and extent of use. They include such diverse types as simple grading rules, dimensional standards to secure interchangeability of parts and supplies, quality specifications for materials and equipment ranging from fruits, eggs, meats, vegetables, and cereals, to metals, machinery, paint, cement, telephone poles, and bed sheets. The criteria for acceptability varies from the simplest kinds of rules to the most elaborate methods of chemical analyses. Notwithstanding all their differences in importance, type, stage of development, degree of acceptance, and in industrial background, all of these industrial standards have been developed for the same purpose, namely, to enable buyer and seller to speak the same language, and to furnish the buyer the means of knowing just what he is getting. Naturally, there is a great difference in the effectiveness in which the various standards fulfill this purpose. The great majority of them do so very imperfectly, while some, as in the case of the standards governing our great commodity markets, and many group and national standards, fulfill their purpose with a high degree of precision.

It follows that the existence of a standard broadens the market for a commodity to which the standard applies, the breadth of the market being coincident with the extent to which the standard is recognized and used.

According to the scale on which it is carried out, the standardization process may roughly be divided into the following stages:

Company standards, both for the purchase of commodities and for the sale of commodities

Group standards, such as standard specifications for materials. Such standards are usually developed by trade groups, technical societies, trade associations, and government departments

National or inter-group standards

International standards

Our present interest is limited to the activities of technical societies and trade associations in the development of group standards and national standards. The field of standardization activities in which these agencies are engaged is entirely too great to be covered in a single paper, and I shall, therefore, omit from this discussion

[1] A paper presented before the Annual Meeting of American Trade Association Executives, Niagara Falls, Ontario, September 24–27, 1930.

many important activities in such fields as the standardization of accounting methods, cost data and other statistics, bills-of-lading, trade practices, codes of ethics, methods of arbitrating disputes, etc. I shall deal primarily with the standardization of things, chiefly things for sale by one corporation to another; that is, standards for raw and intermediate products. This includes:

Dimensional standards to secure interchangeability of parts and supplies

Purchase specifications for materials and products

Methods of test

Definitions of technical terms used in specifications and contracts

Safety codes

Concentration upon optimum number of types, sizes, grades

I

Examples of Standardization by Technical Societies

In a great many fields technical and professional societies have been the first to undertake group standardization. Most of the early group standards were developed by the technical societies. For example, the fundamental standardization work which made possible the interchange of railway rolling stock, which in turn made possible our national transportation system, was carried out by the master mechanics and master car builders through what were then their technical societies (the Master Car Builders Association and the American Railway Master Mechanics Association, now merged as a technical branch of a trade association, the American Railway Association).

The fundamental job of breaking ground is still being done by technical societies in some of the newer fields, such as motion pictures, in which the Society of Motion Picture Engineers has taken the leadership. On the other hand, in some fields the initiative is being taken by trade associations—a notable example being that of the American Petroleum Institute which actively entered the standardization field in 1923.

American Society of Mechanical Engineers

The American Society of Mechanical Engineers, which has a membership of eighteen thousand engineers in all branches of the mechanical industries, has been engaged in standardization activities since 1885. A large part of its work has to do with dimensional interchangeability of machinery parts and supplies, such as bolts and nuts, pipe flanges and fittings, small tools and machine tool elements, screw threads, and pipe threads. These standards, often developed over a period of years, have in large part come into extensive use in the industries.

In early years the membership on the technical committees in charge of such work was drawn wholly from the membership of the Society. This technical work brought the Society into extensive contact with other societies and organized trade groups, as a result of which many cooperative arrangements were entered into. After the organization of the American Standards Association, all of the Society's standards in this field were broadened, so that official representatives of all other interested organizations are included in the technical committees, thus giving the work a national status. The same is true of a group of nearly a dozen industrial safety codes, such as the one on elevators and escalators, which has become the official guide of the industry and of regulatory bodies having jurisdiction in the subject. The A.S.M.E. Boiler Code has become the "Bible" of the industry and has been legally adopted by nineteen states and fifteen cities.

American Institute of Electrical Engineers

The American Institute of Electrical Engineers has been active in the development of standards for thirty years. Their standards are published in thirty-five sections and cover a wide range of electrical engineering subjects. Most of the standards deal with definitions of terms, methods of rating machinery, methods of test, which lay a basis for determining whether electrical apparatus and supplies comply with manufacturers' guarantees. For many years the Institute had working cooperative arrangements with manufacturers' organizations by which the purely technical standards were developed by the Institute while standards dealing with or affecting details of design were handled by the manufacturers' associations. It was found, however, that it was not possible to draw sharp lines between "technical standards" and "industrial standards." All of the standards have a very definite incidence upon industries and upon the marketing of electrical machinery, apparatus, and supplies; consequently, the Institute has come more and more into cooperative relations with other organizations concerned with the subject, and as a result most of the Institute standards have been or are being broadened and developed into national standards through systematic cooperation of all organized groups concerned with each standard.

Society of Automotive Engineers

The automobile industry is justly considered to be the example *par excellence* of mass production through standardization. The inter-

company, or group phase, of this great undertaking has been carried out in most part through the Society of Automotive Engineers. Their work falls chiefly under two heads:

Dimensional details and parts to secure interchangeability. This includes hundreds of such details as ball bearings, rims, brake linings, gears, brushes, electrical fittings, cap screws, clamps, sprockets, carbureter flanges, gage connections, piston rings, keys, wrenches, spark plugs.

Specifications for materials which the manufacturer, or the parts manufacturer, buys. Under this heading is a group of important alloy steels (which are so numerous that a special numbering system has been devised for convenience in referring to them) specifications for leather substitutes, brass, bronze, copper, zinc, aluminum, and light metal alloys.

In this large group of standards the idea has been followed throughout that, so far as economically justified, there should be standardization as between companies, of parts, supplies, and materials which are used by the manufacturers, so as to provide, as far as possible, a common market in which such supplies and parts may be purchased. There has been no effort to standardize cars as such. In fact, there has been a consistent effort throughout to avoid standardizing general designs or any authentic features such as car effects, which are a natural basis of competition. Only specifications are standardized that promote interchangeability, eliminate unnecessary variety, facilitate production or servicing, promote safety, or advance uniformity in testing, nomenclature, or operating requirements. Methods of testing are established to aid in disseminating knowledge and in comparing performance. The specifications are not intended to limit individuality unnecessarily.

The Society's standards occupy a book of more than six hundred pages. An interesting feature of this publication is that the book carries advertisements by manufacturers which are limited to supplies and materials complying with the standards. Each manufacturer is required to file an affidavit certifying that the products comply with the specifications before the advertisement is accepted.

The Society is officially recognized by the National Automobile Chamber of Commerce as the standardizing agency for the industry, and the Chamber gives financial assistance in support of the work.

Some years ago a group of some fifty responsible engineers in the industry cooperated in making an estimate of the economic savings to the industry through such standardization activities. The final figure in the estimate was a saving of fifteen per cent of the total value of the products, which at that time indicated a saving of $750,000,000 a year.

The extensive mutual interest of different groups in standardization problems has led some of the technical organizations to take on company, and even association, members. This means that they have taken on some of the characteristics and functions of trade associations, thus putting them into a position intermediate between that of the professional society and the trade association. On the other hand, their group members give them somewhat of the flavor, and of the actual functioning characteristics, of a federation. The American Society for Testing Materials and the National Fire Protection Association are of this type.

American Society for Testing Materials

The two main functions of the American Society for Testing Materials, which has been active for more than thirty years, are: research on materials; and the development of methods of test and of specifications for materials.

Of its 4500 members, about three-fourths are individuals, one thousand are companies, and more than one hundred are trade associations, thus the Society takes on very definitely some of the characteristics of a professional society, of a trade association, and of a limited and highly specialized federation—all within the limited field of materials. The last edition of its standards, issued in three stout volumes, includes five hundred and sixty-three standards. The main subjects under which these fall are: iron and steel; non-ferrous metals; cement, lime, gypsum, and clay products; brick and refractories; preservative coatings; petroleum products and lubricants; road materials; coal and coke; timber and timber preservatives; waterproofing and roofing materials; electrical insulating materials; rubber products; and textile materials. All of these have to do with specifications and methods of test in the materials field.

The company and association members have been a great source of strength in the Society's work, since it has led directly to the authoritative treatment and use of the standards by the management of industrial concerns.

A large number of the A.S.T.M. standards have gone into extensive industrial use. Fifty of them have officially become national standards.

National Fire Protection Association

Like the American Society for Testing Materials, the National Fire Protection Association has individual, company, and association members. As its name implies, its work lies in the field of fire prevention and its standardization activities are directed to that end.

Many of its standards are in the form of codes

which are extensively used by insurance companies as regulations which must be complied with in obtaining fire insurance. Some of the regulations are also legally enforced by municipalities.

The National Board of Fire Underwriters, which is a trade association of the stock companies, has been a powerful factor in strengthening the association's work. The Board promulgates the Association's codes as its own regulations.

2

Examples of Standardization by Trade Associations

Trade associations entered the standardization movement somewhat later than technical societies. Nearly all of the standardization activities of trade associations have developed during the present century, and the greater part during the last half of that period. The interests and activities of the associations have, however, been rapidly increasing and the trade association has already become a dominant factor in the movement.

A trade association of manufacturers may be interested in standardization from the point of view of standardizing the products of its member companies in order to facilitate or promote the sale of their products; or it may be interested chiefly in standardizing the raw materials or semi-finished products which it purchases. Examples of both of these will be given. Associations representing operating companies are usually interested in standardization from the consumer point of view. Associations of distributors have so far played only a very minor rôle in the movement.

American Petroleum Institute

The standardization program of the American Petroleum Institute "is one of the most complete and thorough to be found in any industrial field and is probably unique with respect to the speed and energy with which it was organized and set in productive operation." The reason for the forcefulness with which this program was carried out is the chaotic state which had developed. According to an executive in the industry:

> "It was almost unbelievable.....how little the ordinary operator knew about the material he was using. There were twenty-odd different grades of steel used in pipe by various manufacturers. No two used the same tapered thread or the same character of connections. There were hundreds of different tool joints not interchangeable, millions of dollars worth of stock because of various notions about a particular joint for a desired purpose, when half that material would ordinarily be required."

One large operating company stated that its losses in a single field due to the lack of interchangeability of pipe and tools had amounted to more than two million dollars. The work includes a large group of materials and supplies such as pipe, belting, tool joints, rig irons, derricks, cordage, and pumping equipment. Officers of the Institute have estimated that the industry has for years invested several hundred thousand dollars a year in speeding up its vigorous program, and the industry considers that its program has been an extremely profitable investment.

The Institute licenses manufacturers making tubular and other material complying with its specifications to stamp its official monogram upon their materials.

Lumber

For many years lumber associations have maintained an elaborate inspection service based on grading rules. At the present time this work is carried on cooperatively, largely under the leadership of the National Lumber Manufacturers' Association. The principal features of the work to date are standardization of the names of the species and the quality grading of the lumber. The Association has stated its general policy in the following words:

> "The appeal of the lumber industry for wider and improved use of its products must be founded upon lumber properly manufactured and prepared, reliably and uniformly graded, and sold under suitable guarantees, the necessity of which has been strongly emphasized by wholesale and retail dealers, architects, engineers, contractors, purchasing agents, and industrial consumers in response to a thorough research made by association officials and field engineers."

Some of the regional associations which are members of the national organization are undertaking to enforce compliance with grading rules through extensive systems of inspection.

Apples and Citrus Fruits

Western fruit growers have furnished a striking example of standardizing their products for purposes of large-scale market exploitation. The citrus growers of Southern California and the apple growers of Washington and Oregon have created national markets for their products primarily by the use of a clever, but simple and thoroughgoing standardization program.

The apple growers, through their local associations in the Northwest, have brought about a grading of their apples both by size and by

quality which is so thoroughly well done and is so completely but simply indicated on each box that the producer, the distributor, and the consumer may all readily know that each box contains 40 pounds of apples; the exact number of apples in each box; the quality of the apples both as to color and flavor; and that the apples are of closely uniform and known size. Even the position of each apple in the box is predetermined for every size. So effective has their program been that it placed other apple growing sections of the country at a definite competitive disadvantage. Other sections are now following in the footsteps of their western competitors. It should be noted that this program was based upon two fundamental decisions of policy: first, that these growers should standardize upon apples; and, second, that they should concentrate on a very sharply limited number of varieties determined to be most suitable.

A very similar marketing program based upon standardization has been carried out by the citrus growers of Southern California. While their competitive advantage over the Florida growers has not been as great as in the case of the western apple growers, the more thoroughgoing job of standardization of the Californians has given them some very definite advantages. The work was carried out by the California Fruit Growers' Exchange.

American Gas Association

Most group standardization having to do with manufacturing industries finds its chief field of use in the control of material bought by one company from another. The work of the American Gas Association on the standardization of gas appliances is interesting in that it affects the products which go directly into the hands of the ultimate consumer. The Association maintains a large and well equipped research and testing laboratory. Following extensive research and testing work, the Association is setting up basic requirements for safe operation, satisfactory performance, and durability of domestic gas burning appliances. The work has already had a most marked effect in improving these products. In several types of appliances more than half of the existing models have been redesigned and improved as a result of the Association's work. In this undertaking the Association has sought the cooperation of other interested groups and is still further broadening the basis of cooperation.

3
Comparative Features of Work of Societies and of Associations

As already indicated, much of the pioneering in group standardization activities has been done by technical societies. Most trade associations entered the field later, but they rapidly increased their interest and activities and are now taking a preponderant part in the movement as a whole.

The technical society, its membership broadly representative of a wide industrial field, is in a particularly good position to provide for the interests of miscellaneous, unorganized, and scattered groups. From the very catholicity of its membership, the technical society is in the best possible position, and I believe is under a moral obligation, to give special consideration to the interests of the general public in any projects in which it is taking a leading part. Furthermore, and for the same reasons, I think that it should consider itself under a moral obligation to give special consideration to the interests of consumers, where, as is usually the case, the consumer groups are not well organized.

Adequate financing of standardization work is generally more difficult for a professional society than for a trade association, since its principal, if not its sole, source of income is from dues of individual members, while trade associations, being financed by industry, are more apt to have adequate staffs.

In a trade association, corporate management as such is directly represented. In a strictly professional society this is impossible, since the basis of organization must necessarily be the individual, and to recognize corporation control would break down the professional standing of the organization. This is, I believe, the basic reason for the steadily increasing rôle which the trade association is playing in the standardization movement. Decision and authority cannot be permanently separated. It is fundamental in human nature that management should insist on being in a position to control decisions affecting its own policies. The normal agency for bringing this about in cooperative work affecting competing companies is the trade association.

It is significant that trade associations are more and more setting up technical and professional divisions within their own organizations. For example, the American Railway Association, the Portland Cement Association, the National Electric Light Association, the Laundryowners National Association, all have strong engineering divisions. In numerous cases, these technical branches of the trade associations are carrying on work which was first pioneered in by technical societies. A striking illustration of this tendency may be cited from the history of the American Railway Association. Several of its technical branches were originally independent professional organizations which have been absorbed by the association and placed under the administrative direction of management as such.

These fundamental differences in points of

view and in types of organizations have, in a number of instances, led to jurisdictional struggles between technical societies and trade associations as to which organization should be in charge of standardization programs. In extreme cases these jurisdictional disputes have been based on radically different philosophies of what the nature of a standard should be; whether it should be an ideal placed before industry as an inspiration and a goal toward which industry should strive, or whether it should be a day-by-day working tool of industry, forged through the give-and-take necessary in the work-a-day industrial world, and therefore necessarily bearing the marks of the grime of the shop. I once heard an extreme case put thus: Should a standardization process partake of the nature of a gentlemen's tea-party, or must it needs be a business decision worked out under the stress of various, and often conflicting, industrial forces?

It is unnecessary to add that people generally are not much interested in "paper standards," but only in such standards as are useful as working industrial tools.

These and similar considerations underlie the very definite trend toward intimate cooperation not only between technical societies and trade associations, but between all of the groups concerned in a standardization project. The membership policies of the National Fire Protection Association and of the American Society for Testing Materials are significant examples of this trend.

Several examples of extensive cooperation have already been mentioned and numerous others could be cited, such as the American Petroleum Institute and the American Society for Testing Materials on standards for tests of petroleum products; American Gear Manufacturers Association, the Elevator Manufacturers Association, and the National Machine Tool Builders' Association in cooperative undertakings with the American Society of Mechanical Engineers on subjects of mutual interest to the respective memberships. In several of these instances most helpful cooperative relations have developed from situations that started as jurisdictional rivalries.

4

Organized National Movement

Your Program Committee has asked that I say something on the relations of technical societies and trade associations to the organized national standardization movement.

With hundreds of groups engaged in the development of industrial standards, systematic cooperation was started in 1918 through the organization of the American Standards Association, then under the name of the American Engineering Standards Committee, which actively started to function late in 1919. Through a recent reorganization, the ASA is now a federation (maintained at present by forty-six national organizations, seven departments of the federal government, and twenty-nine trade associations). The ASA is purely a service organization providing:

> A form for the cooperative development and revision of standards.
>
> A systematic method of formal approval of "American Standards."
>
> The official channel of international contact and cooperation in standardization matters. The organization is a member of the International Standards Association through which eighteen national standardizing bodies actively cooperate in the interchange of information and in the effort to eliminate unnecessary differences between the various national standards.
>
> An information service on developments in standardization in this country and abroad.

Over two hundred trade associations, all of the great engineering societies, and nearly forty departments and bureaus of the federal government are actively participating in the work.

Incidentally, the history of the ASA affords an interesting perspective on relations of trade associations and technical societies. It was the original intention of five great technical societies which organized the ASA themselves to provide the general direction of the movement, the idea being that this would be the best way of preventing undue commercial influence. The very first large undertaking which the new organization was asked to undertake revealed conditions which made it necessary to completely reorganize, since the industries refused cooperation in the scheme unless trade associations were brought in on a basis of complete equality. I believe that all of the organizations concerned now heartily agree that the completely democratic and shoulder-to-shoulder cooperative method of directing the movement through technical societies, trade associations, and government departments has greatly strengthened the work, not only of the movement as a whole, but of that of the participating or cooperating bodies.

Simplification

The Division of Simplified Practice, organized in 1921 as an adjunct of the Office of the Secretary of Commerce, but now a division of the Bureau of Standards, functions in the reduction of industrial waste through the elimination of

unnecessary diversity in sizes, types, styles, and other varieties of manufactured products.

The general method followed is through a committee of the manufacturers which reports its recommendations to a conference of the manufacturing, distributing, and consumer groups concerned, followed by formal written acceptances of these groups. It is the purpose of the division to limit the work to simplification as a function separate from that of technical standardization, i.e., to eliminations which can be made from commercial considerations alone, these being based primarily on past sales records, and without entering into technical considerations. As stated in the Department of Commerce *Trade Association Activities:*

> "The layman can proceed successfully with a simplification program, while it would be impossible for him to consider seriously standardization problems by himself."

The "Commercial Standards" work of the Bureau is distinct from that of the Division of Simplified Practice. A year ago the relationship of this work to that of the ASA was worked out by the two organizations and a formal joint statement issued, according to which "Commerical Standards" as promulgated by the Bureau are to be considered as preliminary standards rather than as broadly recognized national standards. The Bureau of Standards, with the approval of the proponent group, is to submit suitable "Commercial Standards" for approval as American Standards, provided there be a sufficiently wide acceptance by the various industrial and technical groups concerned. Primarily, the effort of the Bureau is to serve those groups which have no satisfactory standardization facilities.

5
Conflicts

The standardization process often leads to conflicts between groups. While most of these conflicts finally turn out to be more apparent than real, they frequently lead to controversies which at times take on somewhat serious aspects. Sometimes they are merely jurisdictional in character, but frequently they center in real problems affecting in important ways the nature and content of the standards in question.

Jurisdictional Conflicts

These may arise between societies or between associations, or between societies and associations. It is probable that they will decrease in frequency as industrial and technical groups become more effectively consolidated into well-knit, experienced working organizations. Examples may readily be found in which progress through standardization has been hampered through such jurisdictional questions. This was the case for several years in the radio field, prior to the recent consolidation of associations. Standardization in the electrical field had been set back for years by such a conflict between a technical society and a trade association, but this happily has been now pretty well cleared up. Less serious conflicts have occurred in the mechanical industries.

The Consumer-Producer Problem

The most frequent type of controversy is that which is continually arising between the consumer and producer groups, each of which frequently feels that its just interests are not receiving due, or even fair, consideration. Thus, differences often develop between industrial organizations. To cite only two recent cases: Very definite differences of opinion have developed between the power companies and the valve manufacturers as to the extent to which valves as made by different manufacturers should be interchangeable in pipe lines; and the machine tool manufacturers, the oil companies, and other user groups have taken issue with the electrical manufacturers as to the extent to which electric motors, as made by different manufacturers, should be mechanically interchangeable, the main bone of contention here being what at first sight would seem to be an extremely simple problem, namely, standardizing the distances between the four holding-down bolts in the feet of electric motors.

In the great majority of cases it is inevitable that the consumers should be at a distinct disadvantage since they are generally widely scattered and unorganized as consumers, while on the other hand the producers are generally organized, their interests are concentrated, and they are in a position to attend meetings and take a much more active, continuous, and effective part than are the consumers.

On the other hand the consumers, if well organized and if minded to do so, are in a position to exert effective control.

To illustrate the range and diversity of situations which may readily be found, I may cite six examples, each showing a different division of control:

> In the general field of ultimate consumption, or "over-the-counter" goods, consumers are generally without organization or any means of bringing to bear their points of view, and hence the situation is wholly within the hands of the producers.
>
> In the controversies over the weighting of silk, the American Home Economics Association is making initial efforts to force consideration of the consumer viewpoint.

The American Mining Congress and the American Electric Railway Association, each representing operating companies, have manufacturers as company members of their associations, and the manufacturers sit on the standardizing committees with a status precisely equal to that of the consumer representatives, who may even represent the associations in outside relations.

The trend in the associations of the electric power companies seems to be definitely in the direction of giving manufacturers' representatives a secondary position in their own committees, and not to use them at all as representatives in outside activities.

In the railway groups the manufacturers' representatives are often consulted but not accorded a vote in standardizing committees.

The Bell Telephone System has its own manufacturing subsidiary, the Western Electric Company, which thus becomes merely a unit of the system as a whole.

Drawn issues are bound continually to arise in any movement like standardization which has to do with live issues of moment to industry. A great number of examples could be cited in which the industrial and technical groups concerned have faced each other and the common problem across the table and found an equitable and satisfactory solution because they were bound that such a solution could be found. A tense situation in connection with the elevator safety code has been replaced by a continuing cooperative research program. Still more tense situations in regard to electrical safety codes have been relieved by entirely workable solutions. A stalemate of many years' standing between manufacturers of cast iron pipe and the principal consuming groups has given way to a cooperative research program. The "inductive interference problem" was the name given a few years ago to the bitter controversies over inductive interference between communication and power lines, at times leading to the courts. A conference of executives decided that cooperative research would be a much better way of spending money to settle the outstanding problems than were law suits. The change was made, and symbolical of the changed method, the name of the problem was changed from "inductive interference" to "inductive coordination."

6

Legal Aspects

In its report to the Senate on "Open Price Trade Associations," the Federal Trade Commission says:

"Some of the most valuable kinds of association work may be classed as measures looking to greater economy and efficiency in business. Among these are standardization, simplification, and grading and inspection. In general, standardization and simplification and related movements should tend greatly to lower distribution costs—a development much to be desired." (Senate Document No. 226.)

7

Summary

Perhaps it will facilitate your discussion of the subject to set forth in categorical form what seem to me to be essential functions of the company and of technical and trade associations in the movement.

In the Company

1. Executives should be alive to the economic importance of the movement, and in sympathy with it.
2. Standardization work should be specifically provided for and systematically organized, each department concerned taking an active part.
3. The company should cooperate actively in standardization work of the trade association, and through it, in the development of national standards.
4. The head or heads of the standards organization should act as authoritative spokesmen of the firm in standardization work in their trade association, and should cooperate in the standardization activities of technical societies.
5. Conversely, the set-up should be such as to permit an immediate start in the introduction of each new national or association standard which concerns the work of the company.
6. The goods the company buys and the goods it produces for sale should be dealt with by this same general method.
7. All this should be equally true of big firms and of little firms, of manufacturers, of distributors, and of operating companies. In the same general sense it should be true of city, state, and federal governments.

In Societies and Associations

8. Associations should have effective machinery for promptly getting a real consensus of all members concerned with a particular subject.
9. An educational function of the association should be to bring home to the executives of its member-companies the economic importance of standardization, and its significance as a managerial tool.
10. In consultation with other groups and with the national body, each organization should

decide what part of its standardization work is to be handled purely as an association matter on account of its scope and influence being limited to one narrow field without reflexes upon other industries, and what part needs cooperation with other groups, from the point of view of national standardization.

11. The organization should play a thoroughly responsible part, and should require responsibility on the part of its members and committees.

a. It should provide responsible representatives on the working committees of the national body, and whenever possible back up such representatives by a committee, and then see that its members are kept informed of the acts of their representatives.

Most men do not fully understand the meaning of representation, or of the responsibilities which it entails. It is the duty of a representative to keep sufficiently in touch with his organization so that he can correctly interpret its attitude in the development of the work and in participating in decisions in committee; to keep his organization informed of developments; to act as a leader in the formulation of the policies of organization in regard to the matters with which he is dealing; and to refer back to his organization questions upon which he feels unauthorized to speak for it.

b. Responsibility in the sense of carrying out with administrative competence, work for which responsibility has been assumed.

c. Accept responsibility for the consequences of the acts of its authorized committees and representatives.

Judged by these criteria, the majority of the numerous associations and societies with which I have had contact could not justly claim a consistent record for responsibility.

12. Technical staff assistance to voluntary committees is generally necessary. Such assistance generally pays for itself many times over in saving the time of committeemen—minimizing the number of meetings required, etc.

13. The association should systematically promote the use, by its own members and by industry generally, both of its own standards and of those national standards in whose formulation it has taken part.

14. Organizations should make their decisions in standardization matters with due regard to the interest of other groups, and of the general public, and also (especially in the case of technical societies) with regard to the interests of unorganized consumer groups, as well as on the basis of service to their members. They should not seek to use the movement merely to advance their own prestige.

These principles may be still further condensed by quoting from its report on Industrial Standardization, some conclusions of the National Industrial Conference Board as to what an effective standardization program requires of an association:

"A secretariat alive to what is going on in the entire field of trade association activity, and aware of the dangers of a provincial or too narrowly selfish outlook in the buying, producing, and marketing of goods on a national or international scale.

"An understanding on the part of the membership that cooperation may be essential, and that it does not mean, of necessity, that 'somebody is trying to run their business for them.'

"The demonstration of how standardization can be used to strengthen trade-marks and brand names by changing the emphasis to essential characteristics."

Federal Trade Commission Rules on Brands

A precedent which may have an important bearing on other industries was set up by the Federal Trade Commission in promulgating on May 1st the rules of business practice adopted by the hardware jobbers of fourteen southern states following a trade practice conference in Washington. Of peculiar interest is the view which the Commission evidently holds that even the failure to mark or brand with respect to quality, grade, or weight may in special circumstances be equivalent to unfair trading. Two of the rules which have an important bearing on the question of grading and labeling follow:

"The marking or branding, or not marking or branding, of merchandise by manufacturers or distributors for the purpose and with the effect of misleading or deceiving purchasers with respect to the quantity, quality, grade, size, or weight of the goods dealt in by the industry, is an unfair trade practice.

"The sale or offering for sale of any product of the industry with intent to deceive customers and prospective customers as to the quantity, quality, substance, or grades of such product, is an unfair trade practice."

Many Industries Using Standards to Aid Merchandising

Organizations which use labels or their equivalents to indicate compliance with standards or specifications are listed as follows in *The Commercial Standards Service and Its Value to Business*, a publication of the U. S. Department of Commerce:

American Corn Millers Federation has adopted a symbol to be licensed by the federation to all millers who will agree to conform to its specifications for corn meal.

American Gas Association has established a gas appliance testing laboratory and permits manufacturers of appliances approved by the laboratory as complying with the association's safety requirements to attach to the appliance the official approved seal of the association.

American Institute of Steel Construction (Inc.) permits its members who adhere to its code of standard practice to use the institute's symbol as a label for their commodities.

American Petroleum Institute grants to manufacturers the right to place its official monogram on certain standardized equipment upon certifying that the material so marked complies with the institute's specifications.

American Society of Mechanical Engineers permits manufacturers to place the A.S.M.E. symbol on a boiler complying with the requirements and tests of its boiler construction code.

Arkansas Soft Pine Bureau permits member mills to use the registered symbol of the association with stock grade marked in accordance with American Lumber standards.

Associated Factory Mutual Fire Insurance Companies permits manufacturing firms to use the association's identification mark of approval on devices specifically approved by the association as to both design and construction.

Associated General Contractors of America enters into agreement with manufacturers in accordance with which concrete mixers complying with A.G.C. standards carry the name plate indicating this fact.

Associated Knit Underwear Manufacturers of America has adopted a standard mark, protected by law, to be used by manufacturers on garments made to conform to standard measurements recommended by the National Bureau of Standards.

Associated Tile Manufacturers has adopted a color scheme for grade marking and is issuing certificates to accompany packages of white glazed tile and unglazed ceramic mosaic manufactured to comply with the simplified practice recommendation relating to this group of commodities.

Better Bedding Alliance of America was organized chiefly to encourage the truthful labeling of the filling contents of bedding and the discouragement of any misrepresentation of the product.

Canners League of California secured the adoption of a law requiring all canned peaches, pears, apricots, and cherries of a grade below certain approved standards to be marked with the word "seconds" embossed on the top of the can.

Commission on Standardization of Biological Stains issues certificates in the form of labels to be attached to bottles containing stains submitted to it and found to comply with its specifications.

Concrete Products Association issues certificates of quality to its members when it is found that their products meet the requirements of the American Concrete Institute standards.

Glycerine Producers Association permits members that follow the association's formula in manufacturing radiator glycerine to use the association's seal as a label to indicate the quality of their radiator glycerine.

Heating and Piping Contractors National Association has adopted a national insignia and certificate and also a boiler plate for the identification of heating plants complying with its specifications.

Interstate Cotton Seed Crushers Association dismisses from membership any of its members found guilty of misbranding or adulteration.

Malleable Iron Research Institute issues to manufacturers of products conforming to its specifications certificates which permit them to use the trade-mark of the institute in advertising their products.

Maple Flooring Manufacturers Asso-

CIATION permits member firms to use the association's trade-mark on maple, beech, or birch flooring guaranteed by the association to comply with its grades and standards.

NATIONAL ASSOCIATION OF FINISHERS OF COTTON FABRIC licenses its members to use the association's label showing that goods to which it is applied comply with the association's requirements for fastness to light and washing.

NATIONAL RETAIL LUMBER DEALERS ASSOCIATION permits its member companies to issue to purchasers certificates, underwritten by the association, guaranteeing that the material delivered conforms in grading with nationally adopted manufacturer's standards, and in quantity exactly with the invoice rendered.

NORTHERN HEMLOCK AND HARDWOOD MANUFACTURERS ASSOCIATION has adopted a system of branding and grade marking whereby a member firm is assigned an identifying number and is licensed to use the association's brand to show that its lumber is graded in accordance with American Lumber Standards.

PAPERBOARD INDUSTRIES ASSOCIATION grants to its members the privilege of using its insignia in connection with the certificates used by the manufacturers showing that boxes bearing these certificates conform to all construction requirements of the consolidated freight or the official express classification.

PIPE NIPPLE STANDARDS CORPORATION (not a manufacturing firm, but made up of representatives of manufacturers) licenses manufacturers to use its registered trade-mark stamped on goods to identify pipe nipples manufactured to comply with its standards.

PORCELAIN PLUMBING FIXTURE MANUFACTURERS (advisory committee to the Bureau of Standards) issues labels certifying compliance with the commercial standards for porcelain plumbing fixtures.

SOCIETY FOR ELECTRICAL DEVELOPMENT has inaugurated a so-called "red-seal plan" for identifying a house that is properly and adequately wired in accordance with approved specifications.

SOUTHERN PINE ASSOCIATION employs a staff of inspectors to visit the plants of its member firms who are permitted to place the mark of the grader on all lumber they make.

STEAMBOAT INSPECTION SERVICE OF THE DEPARTMENT OF COMMERCE permits manufacturers to identify by labels, or advertising, devices built to comply with its requirements.

TISSUE PAPER MANUFACTURERS ASSOCIATION authorizes its members to use the official label and seal of the association in guaranteeing packages of tissue paper to be in accordance with the simplified practice recommendation for this commodity.

UNDERWRITERS' LABORATORIES, maintained by the National Board of Fire Underwriters, have prepared definite specifications relating to design details and performance characteristics of certain appliances and devices and licenses manufacturers receiving the required inspection and testing service to identify goods meeting its specifications by means of stamps, labels, or other markings.

VITREOUS CHINA PLUMBING FIXTURES MANUFACTURERS (advisory committee to the Bureau of Standards) authorizes manufacturers to employ labels for grade marking products complying with the simplified practice recommendations for this group of commodities.

THE WALLPAPER ASSOCIATION OF THE UNITED STATES has adopted an association trade-mark and label for use on the back of wall-paper samples, guaranteeing conformity to all requirements as specified by Department of Commerce pamphlet entitled "Wall Paper, Commercial Standard CS16-29."

New Federal Specifications Are Available

The following specifications have recently been circulated by the Federal Specifications Board:

Pipe and tubing; copper, seamless: Pipe (standard, iron-pipe size); Tubing (for pressures up to 450 pounds per square inch) —WW-P-378

Packing; Asbestos, sheet, compressed—HH-P-46

Tape; Friction—HH-T-101

Fire-Alarm systems; Electric, hand operated—W-F-391

Sodium-carbonate; Granular (monohydrate crystals)—O-S-581

Time-clock systems; Electric—W-T-411

Soda; Caustic (lye): for cleaning purposes—P-S-631

Brushes, scrubbing; Deck—H-B-531

Copies of the above standards may be obtained at five cents each from the ASA Information Service, or from the Superintendent of Documents, Government Printing Office, Washington, D. C.

The Fourth Year of the Soviet Standardization Program

A Discussion of the Accomplishments of the Soviet Standardizing Agencies during the Fourth Year of Their Activity; Some of the Difficulties Encountered Are Also Discussed

The following is extracted from the article "The Fourth Year of Standardization Activities" by Z. A. Papernov, which appeared in the February, 1930, issue of Vestnik Standardizatziyi (Standardization Review) the official organ of the Committee on Standardization of the Soviet of Labor and Defense:

The last session of the Soviet on standardization emphasized the necessity of a sharp increase in the tempo of standardization work. It was pointed out that all reconstruction work must be based on standards and that standards should, therefore, precede such work. . . . The leaders of the Soviet have indicated that in the selection of standardization projects, precedence should be given to those which are most important and are most urgently needed for the reconstruction of the economic prosperity of the country.

. . . A prime requisite for success was the working out of a general prospective plan which would serve as a guide for all further development. At the time of the meeting of the Soviet there existed monographs on only two or three branches of industry, and the committee on standardization had first of all to organize a special division which has just completed a report on the five-year plan with reference to standardization.

During the last year (October 1, 1928, to October 1, 1929), 445 standards were adopted and the total number of approved standards now exceeds 1000 . . . all of which had to be published hurriedly and at frequent intervals. . . . The demand for standards is great; 1,500,000 were distributed in one year, and more would have been distributed if we had had the means to satisfy the demand in full. But the making of standards is a difficult business.

. . . Many factors have contributed to the tremendous increase of interest in standardization work . . . above all the ruling of the government demanding that "no violation of a standard should be allowed to take place without penalty."

. . . From the point of view of the organization of mass production, the establishment of a standard system of fits and tolerances is of paramount importance. . . . Our standards, assuring practical interchangeability with the standards of the most important countries of Europe, allow us to organize a mass production of gauges and rational importation from foreign countries. Experience has shown that import is the most important phase in standardization work. . . .

It is necessary to point out here that our system of tolerances, as well as all our standards, is based on the metric system, in spite of the fact that not all branches of industry have adopted metric units. Moreover, a great deal of the equipment and manufactured goods imported is not dimensioned in metric units.

If no immediate measures be taken for the introduction of the metric system in industry, we shall have to provide for two systems of weights and measures. Alongside of the legal meter we shall have to have a legally sanctioned standard foot or legally established conversion tables. Our plants will have to have two systems of measuring instruments: for meters and for inches.

This problem appears most acutely when equipping new industrial plants. Right now, for example, we are confronted with the problem of purchasing equipment for the manufacture of roller bearings. The government department in charge of this industry must serve automobile manufacturing plants using the metric system as well as plants using inch dimensions. If we don't provide a double set of equipment, a part of this industry will have to continue to depend on imported ball bearings.

This matter is of particular importance in new branches of industry such as the manufacture of automobiles and tractors, and a committee on standardization has therefore decided to recommend measures for insuring a uniform adoption of the metric system in our automotive industry.

Parts Standardized before Equipment Types

. . . In approving numerous standards for fittings and other elements of metallic manufactures and agricultural machinery, we followed the routine practice of foreign countries where standardization as a rule does not govern the

type of machinery or structure. In those countries, types and brands are quite stable and the competition of firms does not permit the establishment of a government or "national" assortment of types. But this position of foreign committees on standardization with reference to types, which is of necessity conservative, is not at all obligatory with respect to our conditions, in fact, it is technically inadmissible. Thus, when the German committee proceeds to standardize wood staves for barrels, it does so starting out with definite dimensional types of barrels. To us, this standard stave was presented prior to the approval of types of barrels, which necessitated subsequent changes in order to obtain the desired barrels.

When Ford standardizes elements of motors, he does so having in mind motors of an established type. With us many months were spent in working out standards of castings and forgings for AMO F 15 and by the time we finished this type of motor had lost its economic importance.

The Ukrainian Committee on standardization of agricultural machinery has done a great deal of careful work on standards of types of elements, some of which have since been abolished in accordance with the five-year plan of industrial development. It appears now that all this obsolescent material did not at all deserve the labor the committee expended upon it. . . . Standardization work in the tractor industry is entirely inconceivable without the preliminary adoption of types.

Building Materials Standardized

A similar situation exists in the building construction industry. We standardized building materials, doors, etc., but we have not been able to work out a standard for windows, largely because of the lack of definiteness as to the types and character of buildings, the details of which we wish to standardize. In the meantime, we are organizing factory mass production of building elements—this prior to the fixing of such fundamental dimensions as the height of stories, etc.

The following example illustrates the dependence of our technical standards upon transportation rates. In working out a standard for pumice gravel for building purposes, we discovered that railroad transportation rates for this material rise abruptly as soon as its grain size exceeds 50 mm. Somewhat similar considerations having to do with the development plans of the country as a whole influence us when we attempt, for example, to substitute, wherever possible, a ferrous metal for a non-ferrous one, the purpose in this case being to reserve our insufficient supply of non-ferrous metal for absolutely specific uses.

On the other hand, after we define several sorts of manufactured articles with a definite gradation of quality, we haven't yet insured the actual manufacture of all the sorts indicated. Further organization work is necessary to regulate the manufacture so as to stimulate a proportioned manufacture of all the sorts. When we failed to do this in the case of purée of tomato, the producers, on the basis of our standard, confined themselves to only the lowest grade specified, and the standardization organizations were compelled to revise the standard referring to the last sort by raising the requirements.

There is no doubt that industry views standardization with greater favor. The original desire for crude limitation of assortments has given place to a more sympathetic attitude than had formerly been the case.

Standards of Quality Maintained

We have had trouble with the introduction of textile standards, the manufacturers claiming that the unusual demand for increased output and the difficulties with the supply of raw materials make it impossible for them to maintain the standards of quality demanded. The committee on standardization could not agree to this. The increase in output demanded by the five-year plan should not be effected at the expense of quality; on the contrary quality should be regularly improved as equipment and industrial management become more efficient. For this reason departures from the standard are allowed by us only in exceptional cases, when we are thoroughly convinced that a suspension of standards is absolutely necessary.

We are particularly careful with standards for food products. Several weeks ago we had under consideration standards for filled candies, which allowed some crude adulteration. Fruit was to be replaced with vegetables and the use of flour and grits was allowed. . . . Such adulteration is the more unjustifiable since the supply of fruit is far from short. The standard was not approved.

During the past year we approved over 200 standards for agricultural materials and products and 100 more will be added within a few months. In the field of pharmaceutical materials we worked out an All-Russian standard applying equally to foreign and domestic markets. Our standards for hemp, wool, and dairy products allow sorting and grading to take place at the point of production instead of at the manufacturing plant. . . .

(At the end of the article the author discusses the lack of unbiased sympathetic cooperation on the part of scientific research institutions when called upon to elucidate or to suggest proper methods of testing.)

ASA PROJECTS

Standard Fits between Cylindrical Parts to Be Studied by ASA Committee

by

John Gaillard, *Mechanical Engineer*
American Standards Association

Present American Standard to Be Reviewed for Revision and Supplementing on Basis of Recent Experience

In 1920 a technical committee on "Plain Limit Gages for General Engineering Work" was organized under the procedure of the American Standards Association by the A.S.M.E. as sole sponsor for this project. It has now been decided that this committee will be reorganized with the purpose of reviewing the existing American Tentative Standard (B4a-1925) on "Tolerances, Allowances and Gages for Metal Fits" in order to determine whether this standard should be revised and supplemented. Furthermore, the original scope of the work as formulated in 1920 also included "Methods of Gaging and Specifications for Plain Limit Gages." A draft standard on this subject has been worked out by the original technical committee but never was perfected to the degree which appeared to warrant its presentation to the sponsor body for submission to the ASA for final approval. The reorganized committee is now expected to take up this subject again and such others as were intended to be dealt with, under the original plan.

Introduction of Standard Fits

It has been found that the American Tentative Standard (B4a-1925) on "Tolerances, Allowances and Gages for Metal Fits," which now has been at the disposal of American industry since 1925, has not been introduced into manufacturing practice to the extent that the importance to industry of a unified system of tolerances and allowances would seem to warrant in a country whose mechanical industries have become famous for their pioneering in mass production methods in manufacturing.

Criticism of the existing standard concerns mainly two points. One of these is the problem of the use of reamers as now commonly listed in the tool manufacturers' catalogs. The other is the absence, in the standard, of a series of fits arranged in accordance with the "basic shaft" system.

With regard to the reamer problem, the objection has been raised that the present commercial reamers, as made and kept in stock by the tool manufacturers, cannot be used, in general, for the economical production of American standard holes. It seems that the remedy could be found in the current reamer sizes being modified so as to be adapted to the requirements of standard holes. Proposals have been made to apply a solution of an entirely opposite character, namely, to maintain the present commercial reamer sizes and adapt the standard hole tolerances to them. This would mean a complete change in the fundamental plan of the present standard which specifies holes whose tolerances extend upward from the nominal size. In this connection, it is interesting to note that unilateral plus tolerances on basic holes, extending from the nominal size as the reference or zero line, have been recognized as the best system to use for a national standard in this country and all others where the problem of fits has been dealt with.[1] It has also been proposed as a basis for bringing about international uniformity of practice. The technical committee will perhaps give consideration to a suggested modification of the numerical values of allowances and tolerances for the several fits so as to give the designer a larger choice.

Absence of the basic shaft system in the present standard is based on the consideration that while it may be true that the large majority of users of fits will preferably use the basic hole system, the number of those who could with advantage use the basic shaft system, cannot be entirely left out of consideration. There are several cases, and indeed entire branches of industry—such as the manufacturers of power transmission equipment—where fits are estab-

[1] National standard systems of fits have been adopted in Austria, Belgium, Finland, Germany, Great Britain, Holland, Italy, Norway, Sweden, Switzerland, and the United States.

lished exclusively, or almost so, between external parts and shafts without any finishing process being required on the latter. Sometimes cold drawn steel bars can be used for this purpose, while in other cases such stock is used after having been given a grinding finish by the supplier, thus also rendering any further machine finish in the consumer's plant superfluous.

No tight fits can be established between the basic holes as now specified in the American standard and shafting material of the kind just referred to, as the manufacturing tolerance on the latter lies below the nominal size. Therefore, mating parts can never give a closer fit, under these conditions, than a so-called "metal to metal" fit, occurring between a basic hole having its minimum size, and a basic shaft having its maximum size. The only way of getting tight fits, in such a case, is to vary the holes to establish different fits with the basic shafts.

All of the national standard systems of fits now in existence, with the exception of the present American and the British standards, comprise both the basic hole and the basic shaft system, thus making it possible for every manufacturer, or an entire branch of industry, to apply that system which is most suitable for its purpose. In Germany, where the national standard has been widely adopted for practical use in the mechanical and other industries, 80 per cent of the standard gages ordered are for fits in the basic hole system, and 20 per cent for fits in the basic shaft system, according to a statement made to the writer by one of the prominent firms manufacturing limit gages.

It would therefore seem very useful if the reorganized technical committee would give due consideration to the question whether the present American standard should not be supplemented by a system of fits given in the basic shaft system.

Study of Work Done by Other Groups

An important piece of work in the field of limit gages has been accomplished in the course of recent years by the so-called "American Gage Design Committee." This is a group of experts representing manufacturers and users of limit gages in this country, which has frequently met in an informal way in order to establish standard designs for gage blanks and other component parts of gages, such as handles. The final report of this committee has been published by the Bureau of Standards as its Miscellaneous Publication No. 100 on "Plain and Thread Plug and Ring Gage Blanks." While it was in course of development, the ASA, upon inquiry of the American Gage Design Committee, signified its interest in the latter's work. It is understood that in the course of time the American Gage Design Committee report will be submitted to ASA for approval as an American standard.

The striving for international uniformity in standard systems of fits is clearly shown by the developments which are taking place in this field under the auspices of the International Standards Association (ISA). These have been described in detail in an article entitled "International Unification of Standard Fits," preprinted from the October, 1930, issue of *Mechanical Engineering*, in the September issue of the ASA BULLETIN. This gives opportunity to the re-organized committee to participate in the international work and thoroughly to study the question as to whether the proposal for an internationally acceptable standard system of fits—as now partially completed by an ISA technical committee—would be acceptable and adaptable to American industry. By participating, the American committee would have full opportunity to suggest such revisions of the proposal as would seem desirable on this side. On the other hand, if the final result of the international work should not appear to be acceptable to American industry, this country might still adopt a standard of its own.

The standardization of fits being a problem of fundamental importance to all manufacturing industries and more particularly so in this country where mass production plays such a prominent part, the step taken by the American Society of Mechanical Engineers as sponsor body, to revivify the work on this project and to review the existing standard in the light of recent experience in this field, will be welcomed by all those concerned. The American Standards Association expresses its grateful appreciation to the old technical committee for the important services it has rendered to American industry and wishes the new committee a successful and speedy completion of its important task.

ASA Approves Standards for Testing Petroleum Products

The American Standards Association has approved the proposed revisions of nine methods of tests for petroleum products and lubricants which were submitted by the American Society for Testing Materials under the proprietary sponsorship method. The A.S.T.M. committee, D-2, which prepared the standard, under the chairmanship of Mr. J. A. Hull of the General Electric Company, is composed of over 100 members representing producers, consumers, and general interests, through sixteen trade associations and U. S. Government Departments.

The revisions, for the most part, consist of minor changes. The American Standard for methods of test for water in petroleum products (Z11h-1930), which is recommended for use with crude mineral oils and fuel oils, has been revised in order to take advantage of greater accuracy of scale divisions and markings of the pear shaped tubes and cone shaped tubes previously adopted. The method of test for water in petroleum products and other bituminous materials (Z11i-1930) was revised in wording only, to make the description of the standard method entirely clear.

The revised American Standard "Method of Test for Distillation of Gasoline, Naphtha, Kerosene, and Similar Petroleum Products" (Z11j-1930) clarifies the procedure in determining the maximum distillation temperature or end point and specifies that "the volumes of the distillate collected shall be observed and recorded when the mercury of the thermometer reaches each point that is a multiple of 10 C or the Fahrenheit equivalent."

The revised American Standard "Method of Test for Distillation of Natural Gas Gasoline" (Z11k-1930) clarifies the procedure for determining the maximum distillation temperature, accuracy, and making the correction for barometric pressures not lower than 735 mm of mercury.

The revised American Standard "Method of Test for Burning Quality of Kerosene Oils" (Z11q-1930), and the American Standard "Method of Test for Burning Quality of Mineral Seal Oil" (Z11r-1930) make it possible to utilize apparatus now available without affecting the results of the tests.

The revised Standard "Method of Test for Burning Quality of Long-Time Burning Oil for Railway Use" (Z11s-1930) includes a table of the test burner dimensions and chimney.

The revised American Tentative Standard "Method of Test for the Determination of Autogeneous Ignition Temperatures" (Z11w-1930) covers minor details affecting the solder bath and asbestos shield and a clarification of the procedure.

The American Tentative Standard "Method of Test for Cloud and Pour Points for Petroleum Products" (Z11e-1930) has been clarified but not changed in technical detail.

The American Tentative Standard "Method of Test for Cloud and Pour Points for Petroleum Products" (Z11e-1930) has been clarified but not changed in technical detail.

The American Tentative Standard "Method of Test for Melting Point of Petrolatum" (Z11v-1930) was slightly modified to include in the specifications "a transparent container of not less than 500 ml capacity that will permit the immersion of the test tube to a depth of at least 75 mm and still leave a depth of 15 mm of water below the bottom of the test tube." The rate of heating the bath was increased.

New Sectional Committee Members

New representatives have been appointed by the American Society for Testing Materials to serve on sectional committees of the American Standards Association as follows:

Sectional Committee on Copper Wire (H4-1928)—H. S. Snell, Western Electric Company, Hawthorne Station, Chicago, Illinois.

Sectional Committee on Petroleum Products and Lubricants (Z11)—H. T. Kennedy, Gulf Production Company, Frick Building Annex, Pittsburgh, Pennsylvania. Mr. Kennedy was formerly one of the representatives of the Bureau of Standards.

Mr. A. J. Kraemer, formerly representative of the American Society for Testing Materials on the sectional committee on petroleum products and lubricants (Z11), is now representing the United States Bureau of Mines on this committee. His address is U. S. Bureau of Mines, Washington, D. C.

British Rubber Industry Needs Standardization

A report on the trade in rubber manufactured goods, issued by the Imperial Economic Committee in April was commented upon in the April 11, 1930, issue of the *Daily Telegraph*, London, as follows:

> "One great need of the industry, the report states, is standardization. Over 150 different types of tires are needed to meet the requirements of cars in the United Kingdom alone. Canada and America cooperate with us fairly well in the efforts for increased standardization. . . .
>
> "Signs of the development of a system of rationalization in the rubber industry of the United Kingdom are noted. 'Such a movement,' it is added, 'will definitely give the United Kingdom industry a progressive policy which should improve its position as one of the staple industries of the country. If in all these measures substantial agreement in the trade throughout the Empire can be obtained, the competitive position of the rubber industry of the Empire should be strengthened.' "

Department of Labor of Nebraska Adopts Many ASA Codes

Safety regulations based almost entirely on ASA safety codes have been adopted by the Department of Labor of the State of Nebraska. At the request of the Department, Cyril Ainsworth, safety engineer of the ASA staff, attended the hearings prior to the adoption of the regulations and assisted the state authorities in their preparation.

The ASA codes which are followed in the Nebraska regulations include:

Safety code for ladders (A14-1923)
Safety code for mechanical power-transmission apparatus (B15-1927)
Safety code for elevators and escalators (A17-1925)
National electrical safety code (C2-1927)
Safety code for laundry machinery and operations (Z8-1924)
Safety code for woodworking plants (O1-1930)
Safety code for abrasive wheels (B7-1926)
Safety code for presses: power, foot, and hand (B11-1927)
Safety code for rubber mills and calenders (B28a-1927)
Protection of heads and eyes (X2-1922)
Building exits code (A9-1929)

Reference is also made in the regulations to the tentative drafts of the safety code for cranes, derricks, and hoists and the code for floor and wall openings, railings, and toeboards (A12).

The foreword to the regulations states:

> "They are based on recognized safe practices and on the provisions of the National Safety Codes approved by the American Standards Association, which Safety Codes are hereby adopted by the Nebraska Department of Labor, and shall apply in all cases not specifically covered by the Nebraska regulations."

It is also provided that new cases not covered by the regulations shall be covered by ASA codes where such codes exist. The new regulations shall apply to all installations of machinery made after adoption of the code, "and to all existing installations and conditions that are not equipped with devices and guards, or constructed, maintained, and operated in accordance with these regulations."

While the Nebraska regulations embody ASA safety codes more completely than the regulations of any other state, many states are making extensive use of the work of ASA code committees.

The objects of the resolution passed by the Association of Governmental Labor Officials, at their convention in Louisville, Kentucky, May, 1930, have already been previously achieved through the action of some of the State regulatory bodies.

The State of Maryland has adopted approximately fifteen of the national safety codes in toto. They are proceeding with the development of a state-wide organization for the administration of these regulations.

The State of Pennsylvania has adopted approximately one dozen of the national regulations, some in toto and some with amendments to fit specific Pennsylvania conditions.

The State of New Jersey has established a policy of adopting national safety codes in toto whenever a revision of their present codes is undertaken or whenever it is decided to develop a code on a subject covered by one of the national safety codes.

The States of Virginia, West Virginia, North Carolina, and Maine have appointed commissions or delegated authority to individuals to investigate the desirability of using the national safety codes as safety standards of their respective states.

Several other states have adopted individual safety codes either in toto or with a few amendments to fit them to peculiar conditions existing in the states.

Standard for Insulator Tests and Ratings Approved

The new American Standard "Insulator Tests and Ratings" (C29a-1930) has just been approved by the American Standards Association. The standard was developed under the joint sponsorship of the American Institute of Electrical Engineers and the National Electrical Manufacturers Association. The sectional committee in charge of the project, under the chairmanship of Mr. J. Allen Johnson, Niagara Falls Power Company, Niagara Falls, New York, included in its membership representatives from the following organizations: American Ceramic Society, American Electric Railway Associa-

tion, American Institute of Electrical Engineers, American Railway Association, National Electrical Manufacturers Association, the Association of Edison Illuminating Companies, the National Electric Light Association, and the Bureau of Standards.

This standard is not to be interpreted as forming complete insulator specifications, but rather as defining the methods of making the various tests described when they are required. The standard specifies design and routine tests for pin and suspension insulators. These comprise tests for dry flashover voltage, wet flashover voltage, puncture voltage, and combined mechanical and electrical strengths. Pin insulators are rated according to dry flashover and wet flashover voltages expressed in kilovolts. Suspension insulators are rated according to dry flashover and wet flashover voltages expressed in kilovolts and also according to combined mechanical and electrical strength. The testing equipment and method of measuring voltage are required to conform to the standards of the American Institute of Electrical Engineers. In an appendix, a method of discussion of the variation of wet flashover voltage with water resistance is given.

New Standard for Dry Cells and Batteries Approved

Revised specifications for dry cells and batteries (C18-1930) have been approved by the American Standards Association and now have the status of American Standard. The sponsor for this work is the U. S. Bureau of Standards. These revised specifications cover definitions, nomenclature, types, standard sizes, materials and workmanship, jackets, marking, sealing compound, terminals and cell connections, voltage tests, capacity tests, and performance requirements for dry cells and batteries for radio, telephone, ignition, flashlight, and other uses. This revised standard differs from the preceding edition principally in that the performance requirements as expressed in the following tests have been increased: heavy load intermittent tests, light load intermittent tests, continuous tests, and delayed service tests of three, six, and nine months' duration.

The sectional committee which prepared this revision was under the chairmanship of Dr. G. W. Vinal of the Bureau of Standards, and included in its membership representatives from the following organizations: American Electrochemical Society; American Institute of Electrical Engineers; American Railway Association, Signal Section; American Railway Association, Telephone & Telegraph Section; American Telephone & Telegraph Company; National Electrical Manufacturers Association; Bell Laboratories, Inc.; Electrical Supply Jobbers Association; Bond Electric Corporation; Diamond Electrical Specialties Company; Institute of Radio Engineers; National Retail Hardware Association; U. S. Bureau of Standards; U. S. Independent Telephone Association; U. S. Navy Department, Bureau of Engineering; U. S. War Department, Signal Corps.

The standard is now being printed by the sponsor and will shortly be available. Orders may now be placed with the ASA Information Service and will be filled as soon as possible.

Committee to Revise Standard for Coal Mine Tracks

The scope of the project for the revision of American Tentative Standard "Coal Mine Tracks, Signals, and Switches" (M7a-1927) was approved as follows at the Standards Council meeting on September 11th:

> "Standardization of coal mine tracks and signals, including switches, wood and metal ties and other items of track construction, together with recommendations of efficient installation and maintenance practices."

The sponsor for the project is the American Mining Congress. The Standards Council also approved the personnel of the sectional committee in charge of the work, under the chairmanship of F. C. Hohn, superintendent of transportation, Pine Hill Coal Company, Minersville, Pennsylvania. The committee, as approved, will include representatives of the following: American Electric Railway Association; American Institute of Mining and Metallurgical Engineers; American Mining Congress; American Society of Civil Engineers; Association of Manufacturers of Chilled Car Wheels; Coal Mining Institute of America; four commercial timber suppliers; eight manufacturers of special track work material; the National Electrical Manufacturers Association; the American Railway Association, Engineering Division; the United States Bureau of Mines. There will also be five members-at-large.

The project was originally a part of a larger undertaking, initiated in 1924, dealing with underground transportation for coal mines. The project covered: *1* Mine tracks, including track gage; a few dimensional features of turnouts, frogs, and switches; a small amount of nomenclature having to do with these subjects; *2* wheels; diameter, contour, hub, and axle di-

mensions; 3 locomotives, trolley, and storage battery types, including only voltage, weights, drawbar pulls, rating of locomotives and rating of motors.

The most important feature of the present standard (M7a-1927) is the adoption of the 42 inch standard gage for tracks in coal mines. This had been found to form the most suitable curve and the most useful frog angle for most coal mine work. The gage had been in greater use than any other single gage. For any case where other gages might be imperative, alternative steps of 6 inches above and below are recommended. Complete specifications are included for riveted frogs, cast frogs, switch guards, rail turn-outs, and switch stands.

The general project has now been subdivided into three, M7a-1927 being one. The other two are: "Specifications for Coal Mine Cars" (M21) and "Specifications for Locomotives" (M25).

Code for Pulverized Fuel Systems Approved

The "Safety Code for the Installation of Pulverized Fuel Systems" (Z12a-1930) was approved by the American Standards Association on September 4, 1930.

This code is a revision of the code approved in 1927 and was made necessary through the rapid increase in the use of pulverized fuel which has brought into being new developments in methods and equipment. The code covers the construction of buildings housing fuel pulverizing equipment, the ventilation of these buildings, and specifications for dust collection systems. Specifications are given covering methods of preventing explosions through static, through the drying of coal, and through its transportation through pipe lines. The code also contains suggestions for safe operating rules to be printed on instruction cards which can be used for guidance by the employees who are in charge of the operation of such systems.

The standard is one of a group covering the general dust explosion hazards. Other codes in this group which have been approved include "Pulverizing Systems for Sugar and Cocoa" (Z12b-1930); "Prevention of Dust Explosions in Starch Factories" (Z12c-1927), in Flour and Feed Mills (Z12d-1928), and in Terminal Grain Elevators (Z12e-1928).

The National Fire Protection Association and the United States Department of Agriculture are sponsors for the project (Z12) "Safety Codes for the Prevention of Dust Explosions" which includes the codes listed above.

New Standards Available

The following ASA standards have recently been published and are available for loan or purchase through the ASA Information Service. This list supplements the list published on page 19 of the June issue of the ASA BULLETIN:

A11-1930 Code of Lighting: Factories, Mills, and other Work Places—*20 cents*
Z10d-1930 Symbols for Photometry and Illumination—*gratis*
B29a-1930 Roller Chains, Sprockets and Cutters—*50 cents*
B7-1930 Safety Code for the Use, Care and Protection of Abrasive Wheels—*5 cents*
B3-1930 Ball and Roller Bearings—*50 cents*
B5e-1930 Dimensions of Cut and Ground Taps—*50 cents*
B5c-1930 Nomenclature of Milling Cutters—*75 cents*
B18c-1930 Slotted Head Machine Screws and Wood Screw Heads—*45 cents*
Z10e-1930 Aeronautical Symbols—*35 cents*
M14-1930 Recommended Practice for the Use of Explosives in Bituminous Coal Mines—*25 cents*
O1-1930 Safety Code for Woodworking Plants—*5 cents*
Z11k-1930 Method of Test for Distillation of Natural Gas Gasoline—*25 cents*
Z11u-1930 Method of Test for Detection of Free Sulfur and Corrosive Sulfur Compounds in Gasoline—*25 cents*

Report on Radio Receivers

A tentative "Report on Standard Tests of Broadcast Radio Receivers," prepared by the technical committee of the Committee on Standardization, Institute of Radio Engineers, has been published and is available for review through the ASA Information Service.

The report is a tentative revision of one on the same subject which appears in the 1929 edition of the *Year Book* of the Institute of Radio Engineers. It has not as yet been formally approved by the Committee on Standardization of the I.R.E.

It is understood that this material is not suitable for adoption as American Standard at the present time. It will be circulated by the I.R.E. for discussion and criticism so that those engaged in carrying out laboratory tests of broadcast receivers may be in a position to comment effectively upon it. It is expected that after a period of criticism and revision the material will be submitted for adoption as American Standard.

Advantages and Disadvantages of Liquid Soap Standards Discussed

The approval by ASA in January, 1930, as an American Tentative Standard, of the specifications for liquid soap (K14-1930) developed by the Federal Specifications Board has done much to focus the attention of the producer and consumer interests of this industry on the need for a clearer understanding of the advantages and disadvantages which might result from the universal adoption of such specifications.

In referring these specifications to the American Standards Association, the Federal Specifications Board said in part:

> "It is believed that the specifications are in harmony with good commercial practice. They have been submitted to the soap section of the American Specialty Manufacturers Association and to all known American manufacturers of liquid soap, 91 of whom have expressed their willingness to supply soap guaranteed to comply with the specification requirements. . . ." (It was later announced that a total of 110 names had been included on the list.)

After careful consideration of the proposed specifications by the Government for ASA approval under the proprietary sponsorship method, the special Advisory Committee found "the adoption of such a specification . . . desirable." For, even though the proposed specifications were not considered, by all interests concerned, the best possible from all points of view, it was believed that they would provide a more satisfactory basis for purchasing liquid soap for general use than had existed without the specifications. It was the belief of the members of this committee that the majority of the liquid soaps now on the market were so poor that any reasonable specifications, if followed, would tend to bring about a definite improvement in quality.

At the same time it was recognized that requirements for concentration and maximum allowable unsaponified oil might advantageously be included in any future revision of the specifications. It was thought desirable to proceed in the near future, through an ASA Sectional Committee representing the producer, consumer, and other interests in the project, to revise the specifications along these and other lines which might come up during the discussion of the subject.

With the information accumulated during the investigation of the specifications by the ASA committee, the Federal Specifications Board have considered a revision of their Federal Specifications (number 27) which increases the active soap content and sets a maximum limit for unsaponified oils. Copies of this have been distributed to the various manufacturers for review and criticism.

The specifications have been discussed at length in the soap trade press. A summary of the advantages and disadvantages of the specifications, which appeared in an article in a recent issue of *Soap*, is given below. It will be seen from this that in the opinion of the author of the article, the disadvantages far outweigh the advantages. Many of the arguments used against the specifications are of the type frequently advanced by an industry when specifications applicable to the purchase of the industry's products are first proposed.

> "*Advantages*—The purchaser knows exactly the grade of material he is getting so that he can buy from the cheapest manufacturer that has the standard on his labels. It may induce liquid soap jobbers to buy the uniform guaranteed soap from the manufacturer or try to make it themselves by dissolving the proper amount of base in water.
>
> "*Disadvantages*—We can safely assume that the great majority of the manufacturers of liquid soap who belong to this association already produce a product substantially as good or better than the present standard specification for liquid soap. Some even greatly exceed the standard in quality. Even if every single manufacturer of this association would turn out an ideal grade of liquid soap, it still would only cover a fair percentage of the liquid soap actually purchased by the public. Liquid soaps, in addition, are sold by jobbers and small manufacturers in towns all over the country who use as their raw material cocoanut soap base or concentrated soap syrup. These concerns add as much water as they see fit and sell the resulting product in their cities as a good grade of liquid soap. There are some, of course, who do produce a grade equal to the present specifications. A great many others do not. It seems to us, therefore, that the greater problem is to educate not the members of the association but the jobbers who purchase their soaps

and syrups from manufacturers as to just what constitutes a good grade of liquid soap.

"*Adoption of Standard Label*—The adoption of a standard label would put every manufacturer on a dead level of price. No account would be taken of extra service rendered and extra quality. Sums spent for advertising to increase the use of liquid soap could scarcely be spent because a consumer would buy a cheaper soap as long as it had a standard label. The concerns who make good soap and who have built up a reputation in quality and service would be forced to sacrifice the work of years to price cutters who have very little overhead and who would depend on a 'standard' label to make their sale. The result would be ruinous, cut prices and competition with nobody making any profit. There is much made of the fact that if a consumer gets inferior liquid soap it tends to give every other liquid soap manufacturer a black eye. This is not borne out by the facts. The use of liquid soap is constantly increasing. A buyer who would purchase an unsatisfactory grade of liquid soap once might the next time be induced to deal with a well-known house who would give him good quality and service and in that way the manufacturer who produces only quality merchandise would be sure to benefit in the long run."

The September issue of *Soap* published a statement by E. A. Bergholtz, a member of the ASA special committee which reviewed the specifications. According to *Soap*, Mr. Bergholtz points out "rather effectively. . .that there are two sides to the question of liquid soap standard specifications, and that all the advantages do not accrue to the purchaser." Mr. Bergholtz' statement, in reply to a recent report before the Insecticide and Disinfectant Manufacturers Association recommending against the standard, follows:

"In reading the report regarding the adopting of a standard for liquid soap, an impression is created that the advantages are one-sided, and in favor of the purchaser.

"There is one distinct benefit that manufacturers can derive from the use of a standard buying specification. It merits specific attention. It is the dissuasion of the purchasing of low grade soaps. The best is not too good. The marketing of soaps that are cloudy, dark, and of unpleasing odor can obviously do more to discourage people from using liquid soap and to turn to cake soap than the lack of standardization can overcome. Add to this the presence of low soap content, free alkali or excessive oil that gives cloudiness or promotes rancidity, together with a reputation however ill-founded for causing chapping of the skin and manufacturers have a real sales resistance that should not have to be borne by reputable makers.

"The properties of good liquid soap such as clarity and light color, providing the container does not obscure them by its opacity and color, are obvious and positive assets. Inoffensive odors are easy to distinguish.

"But why a manufacturer is reluctant to advertise on the label of the container that his soap is not improperly diluted with water, that it does not contain an improper amount of alkali or free oil or fatty acid is difficult to understand.

"In passing to the section of the report that deals with the disadvantages of standardization, the point was lost sight of that the purchasers of liquid soap do not know who are members of the Insecticide and Disinfectant Manufacturers and who are not. And so, any advantage that may come from any united effort on their part to make the best liquid soap is lost as far as the public is concerned.

"What good does it do to educate the jobbers as to what constitutes a good liquid soap, when their sales depend upon the willingness of the individual who uses it. People are not ignorant of the fact that sales are often 'pushed' on the basis of profit to the seller instead of quality

"Another statement of what is offered as a fact but is really an assumption is the idea that a 'standard label would put every manufacturer on the dead level of price.' If for no other reason than that various oils may be used in the manufacture of liquid soap the price is legitimately variable. The specification does not designate the oil to be used and certainly a potash soap made from olive oil is entitled to a price different from one made from cocoanut oil. Certainly perfumes are not all of one price.

"If every manufacturer is put on the level of price, why are not all brands of aspirin that must pass the rigid, definite, and circumscribing specifications of the United States Pharmacopoeia for sale at the same price? Why, articles that bear a certain and specific trade-mark do not command a common and uniform price!

"It rather seems that the solution lies in encouraging people to buy liquid soap by acquainting them with some mark by which they can avoid poor quality. It is hard to find a reason for thinking that when one has once been disappointed in a liquid soap he will again purchase that same kind of material rather than buy cake soap."

STANDARDIZATION WITHIN THE COMPANY

Specifications and Inspection Play Important Part in New York Central Purchasing[1]

Specifications and Inspection Provide Control of Annual Expenditures of $150,000,000 for Materials and Supplies

The New York Central lines spend around $150,000,000 a year for materials and supplies for maintenance and construction. They annually buy from 200,000 to 250,000 tons of steel rails and 75,000 tons, or more, of track fastenings. In this purchasing, specifications, materials inspection, and research are being relied upon as never before to protect the railroad's many interests, whether they be economy of purchasing, speed of delivery, uniformity of grade, improvement of quality, or safety of service. This work is in the background, but is considered of the greatest importance to the system. It is safe to say that specifications and inspection are behind most of this corporation's buying, while the roots of organized research are reaching into every operation.

This article will deal only with the New York Central specifications. The specifications are outstanding for their comprehensiveness. They are not merely forms on the New York Central lines, but are prepared with unusual care and skill and serve not only as the law in buying, but also as guide books in manufacture.

There are specifications for rail and track materials; for lumber, ties, and other forest products; for fuel; for commissary supplies; and for car and locomotive materials. In the latter branch, the purchasing is almost completely covered by approximately 100 specifications, as follows:

Ferrous Metals—Steel

Carbon steel freight car axles
Boiler and fire box steel
Iron and steel chains for general use
Carbon steel passenger car and locomotive tender axles
Carbon steel bars for springs
Steel rivets for boilers
Carbon steel billets
Carbon steel castings
Steel tubes, flues, and pipes for steam boilers
Rolled steel bars and shapes
Locomotive forgings
Miscellaneous rolled steel plates
High carbon steel bars
Heat-treated knuckle pivot pins for couplers
Steel wheels
Steel brake beams for passenger train cars
Brake beams for freight equipment cars
Coach keys
Steel tires
Normalized carbon vanadium locomotive forgings
Helical springs
Carbon vanadium billets
Galvanized sheets
Cast steel side frames

Ferrous Metals—Iron

Cast iron wheels
Double refined wrought iron bars
Wrought iron pipe
Gray iron castings
Foundry pig iron
No. 1 wrought iron bars
Large wrought iron forgings
Malleable iron castings
Staybolt iron
Crane iron
Wrought iron truck equalizers
Hollow rolled staybolt iron

Non-Ferrous Metals

Metallic packing
Babbitt and anti-friction metal
Zinc
Solder
Ingot copper
Journal bearings—locomotive tenders and cars

Cement, Lime, Etc.

Asbestos cement for boiler lagging and pipe covering
Manila rope

[1] A reprint of "Specifications—The Tap Root of New York Central Buying" from the April, 1930, issue of *Railway Age*, and "Materials Inspection Stressed on New York Central" from the July, 1930, issue of *Railway Age*, by permission of the editor.

Paints, Oils, Varnishes, Etc.

Dark red oxide semi-paste paint
Turpentine
No. 1 lard oil
Varnish cleaning soap
Wood preservative
Thinning oil
Black paint for freight cars
Graphite front end paint
Turpentine substitute
Linseed oil
Black underframe finish
Black enamel
Spar varnish
Turpentine Japan drier

Rubber and Leather Goods

Wrapped air hose for pneumatic tools
Cold water hose
Tender tank hose
Steam hose
Boiler washout hose
Rubber matting
Leather belting
Braided air hose for pneumatic tools
Air brake hose
Air signal hose
Air brake and air signal hose gaskets
Solid sheet rubber packing

Miscellaneous

Foundry coke
Sponges
Soda ash
Hand lantern globes
Colored cotton wiping waste
Colored cotton lubricating waste
Wool-cotton journal box packing, 40–60 mixture
Brushes
Plate and sheet glass
Cushions
Glass panels for glass guards
Glass tubes for boiler water gages
Bell and signal cord
White cotton wiping waste
Hammers
Air brake cylinder compound

There are a number of important parts to every New York Central specification. Of special significance, this road holds to the opinion that specifications should begin with a brief but clear general description of the desired material and an explanatory statement that will help the manufacturer to understand the intended uses for the material. Again, it is recognized that while it would be of marked advantage to be able to determine the anticipated service quality of material by tests and inspection only, this is not entirely possible in some cases, and the processes by which the material shall be made or treated after manufacture, or both, are, therefore, specified.

Next in the New York specifications comes the most important and usually the most difficult part—the enumeration of the tests to which the material must be subjected in order to determine its fitness for service and the limits within which the results must fall to be satisfactory. The tests are as few and as simple as will serve to secure the needed quality and properties. In this connection, the importance of the specification writer is emphasized. He must have a good general knowledge of the manufacture, with its limitations and difficulties, as well as a thorough knowledge of the service of the material, and to these he must add a knowledge of tests and testing methods and their relation to service quality. If the article is such that safety of operation depends on its integrity, this feature receives a lion's share of attention.

Supplementary to the statement of tests required, it is customary to indicate the number of samples to be tested and the manner of taking them. If the methods of tests are empirical or not generally known, the details are described so that the practice of all operators will be uniform. In many cases, requirements for surface finish, general workmanship, permissible local defects in individual pieces, variation in dimensions, also instructions regarding packing and marking, are included.

Committees of Eleven

The New York Central lines have developed an effective way of handling this problem. This will appear from the method of preparing the specifications for the motive power and rolling stock departments. The preparation of these specifications used in the motive power and rolling stock departments of the New York Central system is handled by an organization known as the New York Central Lines' Equipment Materials Committee. This committee is comprised of the superintendent of motive power and the superintendent of rolling stock of each of the roads of the system, as well as the engineer of tests, the engineer of materials, the vice-president of purchases and stores, and other system officers who may be interested in the particular subject. This committee is divided into two sections: (1) A motive power section, which is comprised of the superintendents of motive power; and (2) a rolling stock section, which is comprised of the superintendents of rolling stock, with other system officers already mentioned. Each section has its own chairman and the regular committee of each section consists of 11 men.

If a proposed specification covers material

used only in the motive power department, it is submitted to the motive power section for action, and vice versa, while, if used in both departments, it is known as a "joint" specification, and is submitted to both sections.

For specification purposes, materials used in the motive power and rolling stock departments are divided into classes and designed serial numbers, as follows:

Ferrous metals—steel	Nos. 1001 to 1075
Ferrous metals—iron	Nos. 1076 to 1099
Non-ferrous metals	Nos. 1100 to 1149
Cement, lime, etc.	Nos. 1150 to 1199
Paints, oils, varnishes, etc.	Nos. 1200 to 1299
Rubber and leather goods	Nos. 1300 to 1349
Miscellaneous	Nos. 1350 to ....

The request for a specification to cover material used in either of these departments may come from an officer connected with the locomotive or car shops of any of the system lines or with the operating department of the carrier, or from the purchasing agent who finds the buying unsatisfactory without a definite standard of quality. However the request originates, it is referred to the committee, and the engineer of materials, as a member, is designated to prepare a proposed draft of the desired specification.

The first step of the engineer of materials is usually to study the service of the material, and particularly to secure samples representing lots which have given successful service as well as those which have failed in one way or another. These are analyzed and tested by all methods likely to be useful in differentiating between the good and the bad. It is often desirable to secure from several reputable manufacturers, samples of their various grades of the material. Laboratory tests of these samples, by comparison with the test results from the material taken from service, may serve as a basis of selection, or it may be necessary to try them in actual service.

Commercial Practice Studied

Obviously, it is useless to specify a variety or quality of material which cannot be purchased. It is preferable to select a variety and quality which is produced regularly by several makers. In important cases, if the purchases are sufficiently large, it may be desirable to have a special quality manufactured. The manufacturers are, therefore, consulted. Sometimes it is decided to use the specification experimentally for a few months and to give special attention to the quality of the material received. In such cases, both the laboratory tests and service results are considered, as these may lead to further modification of the requirements.

When the whole study appears to be complete and the results satisfactory, the proposed specification is submitted to the specification committee for approval. After reviewing the proposed specification, the committee makes whatever changes it may deem necessary. When the committee's unanimous approval has been secured, the specification is prepared in final form, numbered, and submitted (in the case of a joint specification) to the chairmen of the motive power and rolling stock sections for signature. When passed by them, it is then submitted to the president of the New York Central system for final approval and signature. After the president's approval and signature have been secured, the specification is printed and distributed to all departments and parties concerned. It then becomes the official standard for all of the roads constituting the New York Central system and is used when the material covered by the specification is required for use in the motive power and rolling stock departments of any of the lines, or for the construction of new equipment.

But this does not end the work of the specification committee, and, particularly, of the engineer of materials, who conducts the detailed investigation for the committee. The whole system must keep up-to-date. Therefore, both service conditions and the new developments in available material must be studied continually. As a result, there are always materials under special study for the formulation of new specifications, or the revision of old ones. Special, and often quite elaborate, investigations, involving both laboratory and field work, are sometimes required.

When a revision of a specification is desirable, the specification is rewritten by the engineer of materials and submitted to the committee in a proposed form for review and approval, and the revised specification, before it is reissued, goes through the same process as a new specification. When reissued, a suffix (A, B, C, etc.) is added to the specification number, together with the date of revision. It is then distributed with instructions to destroy the previous issue.

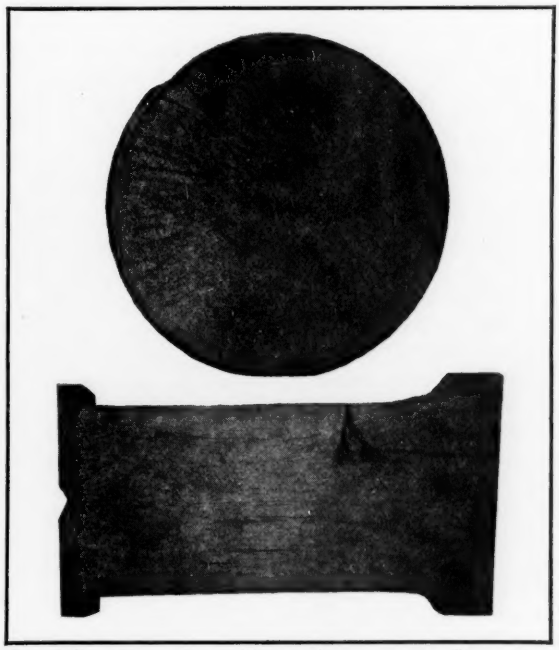
Rail Specifications

Rails represent the largest and most important tonnage of the various steel commodities purchased by the New York Central lines. It was reported at the outset that the yearly purchases range between 200,000 and 250,000 tons. The severity of service conditions to which rails are subjected from heavier power and equipment, operating at increased speeds, requires that unusual care and supervision be exercised during the steel making, rolling, and general manufacturing processes to insure ma-

terial of the highest quality and safety. The need for specifications governing their quality and manufacture is axiomatic. Coincident with the specifications is the importance of properly designed rail sections to obtain stiffness and strength, together with the desired physical qualities which the rolling and composition of the material give.

The late Dr. P. H. Dudley, consulting engineer of the New York Central on rails, ties, and structural steel, was one of the world's recognized authorities on rails, and the designs which he developed after a large amount of track and mill investigations have since been adopted as standard for the entire system.

Specifications for basic open hearth steel rails were just as carefully worked out by Doctor Dudley and have stood the test of time, as they have been in force since 1909, but with slight changes or modifications, although supplemented more recently to cover conditions governing the acceptance of heavier section rails of increased length and to provide for the chemical requirements of special composition rails, a large tonnage of which has been purchased by the New York Central lines during the past three or four years at an extra price over standard. These special composition rails have a lower carbon coupled with higher manganese range, which produces rail steel of considerably higher physical properties and greater factor of safety, along with toughness and better wearing qualities. While not having pioneered in the use of "medium" or "intermediate" manganese steel rails, as this material is designated, the New York Central lines are the largest user of them, the aggregate purchases to date amounting to nearly one-quarter of a million tons.



Specifications Are a Protection against Imperfections like These in Railway Materials

The specifications which have been drawn up for the acceptance of all rails purchased are unusually complete, the various stages in the process of manufacture being quite fully covered, severe tests imposed, the chemical composition limits outlined, and close tolerances adhered to. Furthermore, information is included in the specifications pointing out service conditions which rails are called upon to meet, and their relationship to the quality of the material. This brings the picture before the various departments in the rail plants and aids in securing their full cooperation to help meet the problems of the rails in service.

Closely allied to the rail purchases are track fastenings, 75,000 tons of which are purchased yearly. A variety of material is covered under track fastenings or appurtenances, but the principal items are frogs and switches, splice bars, tie plates, bolts, spikes, rail anchors, and a large amount of other miscellaneous materials. The designs and specifications relating to the principal track fastenings have been developed during years of effort as a part of the work of the New York Central Lines' Engineering Committee, an organization appointed by the president to develop, investigate, revise, improve, and finally recommend engineering standards.

The Engineering Committee is comprised largely of the chief engineers of the New York Central lines and of the Rutland railroad, and other engineers and specialists are called upon for conference in the study of problems with which these representatives are directly concerned. A considerable part of the committee's assignments is handled through sub-committees, reporting their findings to the committee as a whole for consideration. Concurrently with the development of standards of either design or specifications, field studies are made of the practices on the various lines, and the experience of other roads or the work being conducted by national organizations, such as the American Railway Engineering Association. Cooperative studies are also carried on with various manufacturers, and their advice sought on questions of both design and specifications in many cases. The manufacturer is thus given added assurance that every effort will be made to see that the requirements conform to manufacturing conditions at the different plants as far as possible, thus avoiding controversy and insuring a better product.

Changing conditions in service, or in manu-

facturing process, require consideration of revisions in standards, and, as the needs arise, further studies and investigations are made, both from the results of service and conditions at the plants of manufacture. The revisions are then unanimously approved before being recommended to supersede previous issues, and must further receive the approval of the president before becoming the new standard.

Practically all of the important steel materials used in large quantities for track construction and maintenance are now covered by complete specifications, and additions are being made to the list from time to time as the need arises.

The testing, inspection, and analysis of railway materials constitute one of the least known and least emphasized of railway activities although its influence on safety and economy of operation as well as on the development of railway materials is great. The New York Central lines have two large laboratories and employ more than 200 men in this work. The organizations include engineers, chemists, metallurgists, lumber and fuel experts, and even bacteriologists. The best colleges in the land are represented by those engaged in the work. Cooperation in the preparation of the specifications which underlie the bulk of New York Central purchases, and the examination of material conditions and processes to see that the lines get their money's worth in purchasing, are functions of these men who are stationed in laboratories, factories, shops, forests, and field. They are active in research to determine what kind of material a road should buy and the service life of material. They also inspect shop practices. At present, several hundred items of material are undergoing service tests. Wrecks caused by failed materials have been reduced 11 per cent in the last three years by reason of the department's activities.

The New York Central has largely consolidated the work of the several lines forming it, while the activities are divided generally into five divisions. The field inspection of ties, timber, and other forest products is performed by an organization of 63 men reporting to the vice-president of purchases and stores of the New York Central lines. A corps of fuel inspectors, comprising 14 men, also reports to the vice-president of purchases and stores. The New York Central does its own inspecting of rail, track material, steel wheels, and structural steel, and this organization comprises 26 men under the jurisdiction of an inspecting engineer reporting to the president. There is also an electrical inspection force, working under the supervision of the electrical engineer.

The inspection of all materials for equipment, also miscellaneous materials and all laboratory work, is conducted under an engineer of tests reporting to the chief engineer of motive power and rolling stock. This department comprises an organization of 115 men, including 25 chemists and assistants, who are available for all kinds of inspection, analysis, and research work in laboratories at West Albany, N. Y., and Collinwood, O. There are 55 inspectors in the physical laboratories at Collinwood or at other points for the inspection and testing of materials purchased by the lines. The organization also includes 11 men engaged exclusively in the study of the service life of materials and devices used on equipment, 5 shops and equipment, inspectors to investigate all materials causing train failures, a special engineer in charge of locomotive boiler tests and special studies, another special engineer in charge of draft gear tests and a dynamometer engineer in charge of all dynamometer and locomotive road tests.

Rail Inspection

The rail department has the task of handling the inspection of approximately 225,000 tons of rails, 75,000 tons of track material, 75,000 tons of structural steel, and upward of 30,000 steel wheels a year. The 26 inspectors forming this organization are stationed chiefly at points where the largest tonnages are manufactured, these centers being the Pittsburgh, Buffalo, Chicago, and Eastern districts, although the men are shifted to other localities as the need arises. All of the men who specialize in rail inspection have had long experience in the rail mills. They are versed in every step in the process of manufacture and give constant attention to the various details to see that the requirements of the railroad are properly and fully protected from the start of the steel making to the shipment of the finished product.

The men usually work in groups of two to four and personally inspect each rail before shipment, in close cooperation with the inspection department representatives of the rail mill. Checks are made to see that the steel has been well made, properly poured into molds, stripped and charged in reheating furnaces, brought to uniform heat for rolling, the ingots rolled to bloom size, and then accurately rolled into finished rail to meet carefully made gages. They also watch to see that the rails receive proper handling on the hot beds to insure uniform cooling conditions, that the finishing department properly performs its duties in straightening the rails, checking the length, drilling, filing, chipping, and making the preliminary surface inspection. The rails are finally subjected to a re-inspection by the New York Central forces in conjunction with mill inspectors, which inspection covers the entire length of every rail on all four sides for

the purpose of weeding out defective rails or those of inferior quality or workmanship and to see that such work is corrected before final shipment. Every precaution is thus taken to insure that every rail has been identified by hot branding and stamping of the heat and ingot serial numbers, that the rails are free from injurious defects, that they have been accurately rolled and that the rails are straight in line and surface, etc.

The inspection forces also supervise rigid physical tests which every rail must pass to be accepted, and careful records are kept of the results between the various plants, with which to study the uniformity of results from one rolling to another. As a result of their observation while on duty at various rail mills, the inspectors have been able to offer valuable suggestions to the mills for rail handling and manufacture as well as to protect the road against defective manufacture.

Structural Steel and Wheels

Steel wheels are closely allied to steel rails because of their service and also because of the similarity of their composition and manufacture to that of rail. Their inspection presents many entirely different problems, however, but the work is covered in the same thorough manner as the rails. The processes of manufacture are closely followed up and every wheel receives a personal inspection by a member of the New York Central staff, following the work carried on by the mill's inspection forces.

Structural steel inspection is divided into mill and shop inspection. The former consists in checking and testing the various shapes, etc., before they are sent to the shops for fabrication, while the shop inspection is in the hands of carefully selected men who have had years of experience in this particular field, and the various stages in the fabricating work are under constant supervision until the finished member or assembly has been completed.

Corresponding care is taken in the inspection of the variety of track materials such as frogs, switches, splice bars, tie plates, bolts, spikes, and the other items to insure uniformity of fit, finish, general workmanship, and that tests are made to meet the specified requirements. Accurately made gages are used in checking the dimensional features of these materials, and close tolerances are enforced.

The rail department is engaged in numerous other activities, including the collection of failed rails. Cooperative studies of failed material are conducted regularly. Elaborate studies are made of the service of wheels, as well as of defective ones. Shop practices in the mounting and turning of wheels are checked. Service investigations in the field of rails and other materials that go to make up the track structure are also being made. Plants and processes are investigated, following up numerous special tests of materials in service, and there are also consulting duties with the engineering and mechanical departments.

The department is active in national engineering organizations, and also serves on the committees of the New York Central lines, promulgating standard designs and specifications. Lately the track department has been assigning supervisors, or their assistants, to the inspection corps and has thus given the department a further outlet for its work in giving the trackman a better understanding of the value of the material he handles.

The work of the equipment materials department has greatly increased in recent years. This has resulted not only from the addition of more items of material to the inspection lists, but also from the more rigid specifications in force or their more rigid enforcement. The inspection of purchased materials by the motive power and rolling stock sections now covers approximately 230 classes of material for the New York Central lines and the Rutland railroad. From January, 1928, to October, 1929, this department inspected 1,482,000 journal bearings, 973,000 malleable castings, 503,000 steel castings, 390,600 ft. of chain, 143,360 couplers, over 1,000,000 pieces of air and steam hose, 518,500 ft. of miscellaneous hose, 45,000 rods of fencing wire, 440,000 springs, 1,428,500 steel bars, 564,000 cast iron wheels, and 7,594,400 lb. of waste, while 45,419,182 lb. of scrap brass were inspected and check-weighed, much to the benefit of the company. The work of the laboratories at West Albany and Collinwood has increased not only because of the increase in the field inspection work, but because of an increase in the scope of special work such as the failed material investigations. New work of the laboratories includes the analysis of all samples of coal submitted by the superintendent of fuel and locomotive performance, covering not only new supplies of fuel but supplies suspected of causing engine failures. Each shipment of fuel oil for the marine department is now being tested by the laboratories, also fuel and lubricating oil for the electrical division, the latter work having been attended by the complete absence of train failures from that cause during the past winter. In addition, the laboratories have undertaken considerable work for the claim department, ranging from the examination of candy, rice, soap, salt, sugar, coffee, etc., to the fumigation of cars infected by insects.

The work has been enlarged to include the examination of and experiments with various fumigants to kill rodents, etc., and the regular

examination of commissary supplies, such as milk, cream, and ice cream, also the examination of chemical weed killers. A modern bacteriological laboratory has been established at Selkirk, N. Y., for the sanitary examination of drinking water supplies and, at Collinwood, a special laboratory has recently been provided for electric traction work. The laboratory is growing so rapidly by reason of the increasing demands upon it that plans are being considered for new laboratories at both points.

It is one of the test department's functions to assist in the preparation of specifications governing the manufacture of materials, and all material specifications are submitted to it for review and criticism before adoption. Occasionally it is necessary to make laboratory experiments before opinions concerning the specifications can be given.

Service Tests

In the interest of both economical buying and operation, the test department of the New York Central lines is engaged to an ever-increasing degree in conducting so-called service tests, comprising the organized and systematized study of the service life of designated materials used on locomotives and cars and including also the study of materials, tools, devices, etc., placed in use merely for trial or experimentation. Thirty-five more or less complicated service tests are now being conducted, involving 6000 test units on 900 locomotives and 634 cars, while 225 experimental tests are being followed, involving over 83,000 units on 24,485 cars and 618 locomotives, which are distributed among the lines. These tests and those previously named do not include those affecting maintenance of way materials or forest products which are under study by the other inspection divisions. In contrast with the not uncommon practice for railroads to handle service test work in a more or less unorganized way, the New York Central has equipped and planned its test department to serve as a clearing house for practically all information concerning service tests and other experimental work affecting the design and purchase of materials and equipment.

A vital factor in the purchase and use of the material for equipment is its safety. A saving resulting from the purchase of a less expensive for a more expensive material is a mockery if the material causes wrecks or delays to train movements. This interest in material has been furthered on the New York Central by the organized attention given by the test forces to failed materials. Prior to 1924 the work was confined largely to wheel failures, but the work has expanded until at present the inspections of failed materials cover nearly all important failures of locomotive and car materials. The test department has virtually become a fingerprint expert for the road in this field of regulation. Wherever a derailment or delay to train service, chargeable to broken or defective material, occurs or wherever equipment inspection discloses defective material, the test department receives a report with or without the material involved and as quickly as possible directs especially assigned inspectors and other resources to a determination of the causes and the correction of the trouble.

Each failure is catalogued and each year a tabulation of all failures investigated is made. This report lists the failures by classes of material and gives (*a*) the number of derailments; (*b*) the number of delays; and (*c*) the number of inspection failures with which each class of material is charged on (*a*) the lines west of Buffalo; (*b*) the lines east; (*c*) other system lines; (*d*) on all lines. These are supplemented by a record of the total failures investigated in previous years. The report not only summarizes but singles out the offending material and compares one region with another.

The materials listed are as follows:

Locomotive Parts

Driving axles
Trailer axles
Tender axles
Firebox parts
Boiler tubes
Driving boxes
Trailer boxes
Tender boxes
Engine brake hangers
Other brake parts
Main crank pins
Crossheads and bolts
Crosshead plates
Crosshead shoes
Wrist pins
Crosshead keys
Cylinder heads
Draw bars
Draw bar pins
Eccentric cranks
Eccentric straps and blades
Eccentric rods and pins
Wedge bolts
Guide yokes
Stoker reversing rod
Cab handholds
Links and parts
Combination levers
Union links
Radius bars and bolts
Piston heads and bull rings
Piston rods
Reverse gear

Main rods
Side rods
Butt end straps
Rod collar bolts
Driving spring hangers
Misc. spring rigging
Superheater units
Tender brake parts
Back couplers
Back coupler pocket
Tender truck equalizers
Tender truck arch bars
Booster parts
Valve stems
Miscellaneous parts
Driver tires and wheel centers
Trailer tires
Trailer wheels
Tender truck wheels
"Steam whistle" parts

Car Parts

Coupler yokes
Knuckles, pins, and carrier irons
Frames, passenger
Side frames, freight
Arch bar trucks
Bolsters
Spring planks
Pins, bearing, and safety hangers
Equalizers
Pedestals and spreaders
Journals, bolts, and wedges
Steel wheels
Broken cast iron wheels
Loose cast iron wheels
Burned-off journals
Broken-off journals
Broken axles, except journals
Air hose
Brakes, truck equipment
Truck springs
Gas rail car parts

It also classifies the failures by causes and thus directs attention to bad shop practices as well as the improper use of material. Last year's report covered a great many investigations, involving over a hundred classes of material. This is a larger number of investigations than was studied in previous years. This increase from year to year should not be misunderstood. It does not result from the fact that material failures are increasing on the New York Central, even though the annual report of the test department showed a greater number, but simply means that the New York Central is making a determined study of materials. The investigations, made by disinterested and competent persons, invariably set in motion revisions of specifications or other action, while the publication of the list spreads and crystallizes interest.

Check Shop Practice

The shop inspection work being done by the test department is one of the results of the attention given to failed material investigations. It consists of cooperative work between the shop management and the test organizations, whereby test men familiar with the failed material investigations and with shop work regulations are assigned to check shop practices, note departures from prescribed practice, and otherwise work with the local supervisors to get the best results out of material and particularly to prevent its failure in service. The substitution of copper sledges for steel sledges for testing main and side rods in shops as a means of avoiding rod failures in service, the discontinuance of the use of torches to remove retaining rivets from tires and to bevel off the front ends of main rods, improvements in annealing crank pins and piston rods, the substitution of clear varnish for black paint in coating rods and motion work, and improvements in wheel mounting practices are typical results of the activities.

It is impossible to determine the full effect of the department's work in connection with failed material investigations and shop inspections, but the figures concerning derailments on the New York Central are considered highly significant of the contribution to securing safer operation.

There were 19 less derailments caused by failures of material used on equipment in 1928 than in 1926, while the number of derailments per billion locomotive car miles in 1928 were 11 per cent less than in 1926.

Cooperation with National Societies

The test department does a variety of special work suggested by its findings in connection with the routine inspection and testing of materials, or which arises independently of these activities. Its dynamometer work is extensive and its active participation in national railway or other scientific committee work for the purpose of formulating uniform specifications and standards, or for the purpose of keeping in touch with scientific developments and maintaining a close personal contact with other authorities in science, is noteworthy.

Among prominent activities and studies of a specific nature conducted by this test organization of the New York Central in the last several years, either as a part of its regular functions or by special request, are several series of road tests of 70-ton cars equipped with various designs of truck springs, which resulted in the abandonment of a design of

spring which had been proposed for approval as an A.R.A. standard.

After a majority of all passenger train delays during one winter was found to result from steam hose failures, and an examination of approximately 4000 failed steam hose showed that a large proportion of the failures was due directly or indirectly to steam burns, investigations and road tests were conducted which resulted in the adoption of 2-in. flexible metallic connections in place of $1^1/_2$-in. rubber hose.

As a result of investigations and tests of cast steel side frames involving 125 complete fatigue tests and 150 static tests, new system specifications for side frames were adopted which are 50 per cent more severe than the A.R.A. specification then in effect, the frames being used in large numbers without any failures being reported up to the present. During recent years, as a result of a number of failures of passenger car axles, the practice has been followed of drilling and analyzing all passenger car and tender axles purchased by the New York Central lines, a practice which has required a large amount of work but results in keeping inferior axles out of service.

As a result of investigations of journal box packing troubles, initiated long before the A.R.A. issued its recent rulings on this subject, the practice of giving closer attention to the condition of packing selected for reclamation was started and orders issued requiring that reclaimed packing of other than the best quality be confined to freight car service. After making a large number of analyses and tests of 21 different brands of black enamel, the department has prepared a definite quality rating of the products of each manufacturer for the purchasing department.

Inspect Reclamation Work

The test bureau has cooperated with the supervision of reclamation in devising methods of reclaiming large numbers of journal bearings, wedges, and other materials formerly scrapped, and has cooperated with the New York Central Lines' Wheel and Axle committee in the preparation of an illustrated manual of shop practice instructions covering all wheel and axle work. A comprehensive investigation of locomotive water boiler conditions was made by the department for the purpose of determining the locations where water should be treated and the kinds of treatment necessary and the department has since been assisting in carrying out the recommendations of the report.

The department furnishes the chairman of the committee charged with the duty of fixing the standards for small tools and other shop equipment of various kinds on the New York Central lines, such as abrasive cloth, pipe wrenches, sledges, rivet sets, etc., and, like the rail inspection staff, is actively represented in such national associations as the American Railway Association, the American Society for Testing Materials, the American Society of Steel Treaters, and the American Railway Engineering Association.

A summary of the New York Central's test work may appropriately include a work regarding the general procedure of the inspection work in purchased materials. These are principally purchased subject to inspection at the point of shipment rather than at destination. The conditions are set forth in the specifications and the proper inspection department is notified by receiving a copy of the order for any material purchased. It then rests with the supply firm to notify the inspection department when the material is ready for inspection. Usually the instructions in the specifications require five days' advance notice, and the notice may be by letter, telephone call, or any other means at the option of the firm unless a formal notice is required. All copies of orders received by the stores department disclose whether the inspection is required, and it is understood that material subject to inspection may not be accepted or invoices passed for payment until the inspection department's approval is obtained. This approval is shown on a special form and if the form is not received when the material is shipped, it devolves upon the store department to trace the inspection department for it.

A report of each inspection is prepared, showing the amount of material inspected or rejected and the direct expense of making the inspection. This report is filed in the test department where it is available for references. Owing to the large amount of clerical work involved, the department does not regularly prepare summaries of the inspection results but the records are kept in such shape that this can always be done when required. The department's chief concern is to see that all material, subject to specifications, receives inspection, and that this is done with the least delay to the movement of material from the source of supply to the user.

Non-Metallic Tubing Standard

The Underwriters' Laboratories has just published a pamphlet entitled "Standard for Flexible Non-Metallic Tubing." This standard covers minimum requirements, based on tests and field experience, for flexible non-metallic tubing used for the mechanical protection of insulated wires in accordance with requirements appearing in the National Electrical Code, ASA, C1-1930. Copies may be obtained from the Underwriters' Laboratories, 109 Leonard Street, New York City, or through the ASA Information Service.